

What is claimed is:

1. An air conditioning system comprising:

a duct having an intake passage through which outdoor air is induced and a discharge passage through which indoor air is  
5 discharged, the intake and discharge passages being divided by a partition;

suction and discharging fans respectively installed in the intake and discharge passages;

10 a dehumidifier having a desiccant wheel rotatably mounted on an opening of the partition, the desiccant wheel being disposed crossing and exposed to the intake and discharge passages;

15 a regenerating heater for heating air induced into the dehumidifier, the regenerating heater being provided adjacent to an air intake side of the dehumidifier in the discharge passage of the duct;

a regenerating heat exchanger provided on the intake and discharge passages in the vicinity of an indoor side with reference to the dehumidifier to heat-exchange air flowing along the intake passage with air flowing along the discharge passage;

20 and

a heat pump provided on the duct to heat-exchange outdoor air that has passed through the regenerating heat exchanger and discharging the heat-exchanged air to an indoor space.

2. The air conditioning system of claim 1, wherein the desiccant wheel has an outer surface coated with a desiccant material to collect humidity contained in the air flowing along the intake passage and discharge the collected humidity to the  
5 air flowing along the discharge passage by being rotated to the discharge passage.

3. The air conditioning system of claim 2, wherein the desiccant wheel has a first half exposed to the intake passage  
10 and a second half exposed to the discharge passage.

4. The air conditioning system of claim 2, wherein the desiccant material is silica gel.

15 5. The air conditioning system of claim 2, wherein the desiccant material is titanium silicate.

6. The air conditioning system of claim 2, wherein the desiccant wheel comprises:

20 a shaft supported on the opening;  
a plurality of blades extending from the shaft in a radial direction and each having a predetermined width; and  
a rim circumferentially enclosing outer ends of the blades.

7. The air conditioning system of claim 6, wherein each of the blades is provided with a plurality of air-through holes.

8. The air conditioning system of claim 6, wherein a section 5 of the duct is circular-shaped corresponding to an outer circumference of the rim of the desiccant wheel.

9. The air conditioning system of claim 6, wherein each of the blades has a predetermined width in a direction where airs 10 flowing along the intake and discharge passages are advanced.

10. The air conditioning system of claim 1, wherein the regenerating heat exchanger is formed of aluminum.

15 11. The air conditioning system of claim 1, wherein the wherein portions of the intake and discharge passages are formed intersecting each other, and the regenerating heat exchanger is installed on the intersecting portion.

20 12. The air conditioning system of claim 11, wherein the regenerating heat exchanger is provided with a first passage communicating with the intake passage and a second passage communicating with the discharge passage and intersecting the first passage.

13. The air conditioning system of claim 12, wherein the regenerating heat exchanger comprises a plurality of bent plates that are alternately piled up one another such that the first and  
5 second passages can be alternately formed in a multi-layer.

14. The air conditioning system of claim 13, wherein flat plates are disposed between the bent plates to define the first and second passages.

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15. The air conditioning system of claim 1, wherein the heat pump comprises:

a first heat exchanger provided in the intake passage in the vicinity of an air discharge side of the regenerating heat  
15 exchanger; and

a compressor, a four-way valve, an expansion apparatus and a second heat exchanger that are connected to the first heat exchanger.

20 16. The air conditioning system of claim 1, wherein the four-way valve comprises:

a first operation position where an outlet opening of the compressor is connected to the second heat exchanger while the

first heat exchanger is connected to an inlet opening of the compressor; and

a second operation position where the outlet opening of the compressor is connected to the first heat exchanger while the  
5 second heat exchanger is connected to the inlet opening of the compressor.

17. The air conditioning system of claim 16, wherein in a cooling/dehumidifying/ventilating mode, the suction and  
10 discharging fans are operated, the desiccant wheel rotates, the regenerating heat is heated, and the four-way valve is switched to the first operation position.

18. The air conditioning system of claim 16, wherein in a heating/dehumidifying/ventilating mode, the suction and  
15 discharging fans are operated, the desiccant wheel rotates, the regenerating heater is heated, and the four-way valve is switched to the second operation position.

20 19. The air conditioning system of claim 16, wherein in a cooling/ventilating mode, the suction and discharging fans are operated, the desiccant wheel and the regenerating heater are not operated, and the four-way valve is switched to the first operation position.

20. The air conditioning system of claim 16, wherein in a heating/ventilating mode, the suction and discharging fans are operated, the desiccant wheel and the regenerating heater are not  
5 operated, and the four-way valve is switched to the second operation position.